INDEPENDENT OVERSIGHT ASSESSMENT OF RADIOLOGICAL PROTECTION PROGRAMS WITHIN THE DEPARTMENT OF ENERGY

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LIST OF ACRONYMS

ABHP	American Board of Health Physics
ALARA	As Low As Reasonably Achievable
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CHP	Certified Health Physicist
CSO	Cognizant Secretarial Office
DOE	U.S. Department of Energy
DOELAP	DOE Laboratory Accreditation Program
DP	Office of Defense Programs
EH	Office of Environment, Safety and Health
EM	Office of Environmental Management
ER	Office of Energy Research
FAO	Fernald Area Office
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
ID	Idaho Operations Office
INEL	Idaho National Engineering Laboratory
LAAO	Los Alamos Area Office
LANL	Los Alamos National Laboratory
LITCO	Lockheed Idaho Technology Company
LLNL	Lawrence Livermore National Laboratory
MKF	MK Ferguson-Oak Ridge Company
MMES	Martin Marietta Energy Systems
NE	Office of Nuclear Energy
NRRPT	National Registry of Radiation Protection Technologists
OR	Oak Ridge Operations Office
ORNL	Oak Ridge National Laboratory
ORPS	Occurrence Reporting and Processing System
RCCC	Radiological Control Coordinating Committee
RCPA	Radiological Control Program Advisor
RFFO	Rocky Flats Field Office
SNL	Sandia National Laboratories
SR	Savannah River Operations Office
SRS	Savannah River Site
TEDE	Total Effective Dose Equivalent
WSRC	Westinghouse Savannah River Company

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INDEPENDENT OVERSIGHT ASSESSMENT OF RADIOLOGICAL PROTECTION PROGRAMS WITHIN THE DEPARTMENT OF ENERGY

1.0 INTRODUCTION

The Deputy Assistant Secretary for Oversight requested an assessment of the status of Departmental radiological protection programs.

The U.S. Department of Energy (DOE) Office of Oversight was created on December 18, 1994, to consolidate oversight of occupational safety, health, safeguards, and security activities within one independent organization. In order to better understand the status of radiological protection within the DOE complex, on February 13, 1995, the Deputy Assistant Secretary for Oversight appointed the Senior Radiological Protection Officer for the Office of Oversight, and on February 21, 1995, tasked him to assess the status of radiological protection programs within the DOE complex.

This report focuses on significant aspects of radiological protection programs at ten major defense-related sites.

In response to this task, this report addresses the status of radiological protection programs at ten major defense-related sites at the beginning of 1995. Before extrapolating this information for future needs and circumstances, consideration must be given to the fact that the period of the data reported is within the transition, and relative hiatus, between the DOE's past weapons production activities and its future focus on remediation. This information is expressed as a narrative description—a "profile"—of the radiological protection program across the complex, as well as individually for the ten sites. The report intentionally focuses on the most significant performance aspects of the radiological protection programs, but does not attempt to provide an exhaustive technical basis to support the data. The core radiological protection data provided in this report forms a foundation for the generation of more sophisticated profiles by the Office of Oversight. It is expected that future development activities will include similar data from non-defense-related sites.

2.0 SCOPE

Radiological assessment reports for 1992 through 1994 were reviewed.

The EH residents collected the information and data from DOE Headquarters, Fernald, Hanford, Idaho, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Oak Ridge (Oak Ridge National Laboratory, Y-12, K-25, MK Ferguson-Oak Ridge Company), Pantex, Rocky Flats, Sandia National Laboratories, and Savannah River. This included review of three years (1992-1994) of formal radiological assessment reports. Because these ten sites contain all types of radiological hazards and most of DOE's workers, these ten sites can be used to generally represent the status of radiological protection across the complex. The review of DOE Headquarters activities addresses the question of senior management involvement and commitment.

3.0 RESULTS

Radiological protection programs have been established and implemented as required.

During 1994, radiological performance data indicate that for the conditions experienced during this period, workers within the complex were protected from exposure to radiation and radioactive materials. Radiological protection programs have been established and are being implemented consistent with Presidential guidance, "Radiation Protection Guidance to Federal Agencies for Occupational Workers," issued in January 20, 1987. The Department has implemented this guidance through 10 CFR 835, DOE Order 5480.11, and the Radiological Control Manual. While compliance with 10 CFR 835 is not required until January 1, 1996, all ten sites submitted radiation protection programs for DOE review by January 1, 1995, as required.

To assess the risks associated with a worker's exposure to radiation, the nuclear industry, including the DOE, uses the "rem" as the basic unit of radiation dose measurement. Department and regulatory requirements limit a worker's total effective dose equivalent (TEDE) (the sum of external and internal doses) to 5 rems per year, except in special situations. Radiation dose to members of the general public is limited to 0.1 rem per year. Radiation doses to populations are indicated as collective doses in terms of person-rem, i.e., the sum of all TEDE received by the population (such as the DOE workforce).

Line management's commitment to radiological protection measures has led to good performance.

For the ten sites, no workers exceeded the annual TEDE limit of 5 rems during 1994. Of these workers, 96.4 percent received doses less than that permitted for members of the general public (0.1 rem). This good performance can be attributed to line management's commitment to safety, radiation worker training and performance, and the contractor's radiological protection staffing commitment of 1314 non-hourly and 2087 hourly workers. The DOE field radiological protection staff consisted of approximately 44 full-time equivalents.

Some weaknesses were noted.

Deficiencies in the conduct of radiological operations, attention to detail, documentation, and followup of corrective actions for identified problems were the most commonly indicated weaknesses in the radiological protection programs.

The DOE Headquarters cognizant secretarial offices (CSOs) have exercised their responsibilities for the radiological protection programs for activities under their jurisdiction by designating Radiological Control Program Advisors (RCPAs). The RCPAs represent the CSOs

on the Radiological Control Coordinating Committee (RCCC) and act as focal points for radiological protection matters within their respective offices. The CSOs have processed a limited number of requests for approval of alternate approaches to certain radiological protection requirements. The CSOs have exercised only limited direct involvement in radiological protection matters, especially the establishment and maintenance of those programs. The RCPAs lack formal authority to cause actual changes in the radiological protection programs of their respective offices, and their effectiveness is more dependent on their personal character than the authority of their position. The CSOs have not exercised adequate management attention to verifying the adequacy of corrective actions identified in the field and of closing completed action items. For further discussion, see the task team report on Examination of DOE's Response to Defense Nuclear Facilities Safety Board Recommendation 91-6 and Assessment of Radiological Control Coordinating Committee Activities, dated March 31, 1995.

Cognizant secretarial offices have not given adequate management attention to verifying the adequacy of corrective actions and the closure of action items.

The Nuclear Regulatory Commission reported, in NUREG-0713, Vol. 15, "Occupational Radiation Exposure at Commercial Power Reactors and Other Facilities 1993," that 189,711 individuals were monitored for external exposure and accumulated a collective dose of 29,045 person-rems, with 57,702 individuals (30.4 percent) receiving deep doses in excess of 0.1 rem. For comparison, in 1994 the ten DOE sites routinely monitored 84,419 individuals for external exposure and accumulated a collective dose of 1,308 person-rems. Of these, 2890 individuals (3.4 percent) received deep doses in excess of 0.1 rem.

The following profile of the DOE complex is a composite of the ten sites, and although it does not include all sites where DOE has radioactive material or radiation, it is believed to be a useful approach to visualizing the program and its performance.

The results summarized here represent a composite of the ten sites.

GENERAL OVERVIEW

DOE's mission involves many activities that result in radiation exposure to workers and the generation of liquid, airborne, and solid radioactive waste streams. The DOE reported 409 nuclear and 793 radiological facilities within the ten sites. These are involved in weapons dismantlement; operation of nuclear reactors; handling of tritium, plutonium, uranium, and thorium in various forms; handling and storage of mixed fission products and spent nuclear fuel; processing of radioactive waste; the use of accelerators and x-ray machines; and a myriad of activities associated with remediation of formerly used facilities. DOE sites have posted radiological controls, including controls for radiation areas, high radiation areas, very high radiation areas, airborne radioactive material areas, and contamination and high contamination areas.

The Department's mission involves many activities that can expose workers to radiation and generate radioactive waste streams.

During 1994, the ten sites shipped 1.2 million cubic feet of low level radioactive wastes for disposal. In addition, approximately 26.2 million cubic feet of low level radioactive wastes and 11.2 million cubic feet of mixed wastes remain in storage at these sites.

During 1994, one event was reported as a radiological emergency, and 116 radiological events were reported pursuant to DOE Order 5000.3B as unusual radiological occurrences. The emergency was reported by Fernald and involved a radioactive material transportation vehicle accident. The unusual radiological occurrences involved topics such as radiological monitoring equipment operability, skin contaminations, and discovery of radioactive materials outside controlled areas.

In 1994, one radiological emergency and 116 unusual radiological occurrences were reported.

RADIOLOGICAL PROTECTION ORGANIZATIONS

For the ten sites, DOE currently has 44 designated radiological protection positions. Five of these full-time Federal positions are filled by four individuals who are certified by the American Board of Health Physics (ABHP) and one registered by the National Registry of Radiation Protection Technologists (NRRPT). However, additional Federal personnel would be eligible, based upon education and experience, to apply for certification. DOE contractor organizations currently have 1,314 non-hourly and 2,087 hourly radiological protection positions. Of these, 96 (7.3 percent) are certified by the ABHP, and 290 (13.9 percent) are registered by the NRRPT or certified by state organizations.

Most individuals serving in radiological protection positions are not professionally certified or registered; however, many of them are qualified to apply for certification.

All DOE contractors have submitted their radiological protection programs for DOE's review as required by 10 CFR 835. As of March 1995, contractors reported an average of 59 percent conditional compliance with the requirements of 10 CFR 835, with a compliance range of 17 to 100 percent.

All contractors have submitted their radiological protection programs for review as required.

PERSONNEL DOSIMETRY

External dosimetry programs at all ten sites have received accreditation from the DOE Laboratory Accreditation Program (DOELAP). This program is very similar to, but more rigorous than, the National Voluntary Laboratory Accreditation Program used in the commercial industry. During 1994, DOE contractors at the ten sites issued DOELAP-approved permanent personnel dosimeters to 84,419 individuals. Also during that period, 2,890 personnel received greater than 100 mrems deep dose, and 12 received internal exposures greater than 100 mrems committed effective dose equivalent. The collective TEDE for 1994 was 1,308 person-rems. No exposures in excess of the 5 rems TEDE limit occurred during 1994, and no planned special exposures as permitted by DOE regulations were authorized during the period.

External dosimetry programs at all ten sites are certified by the Department's Laboratory Accreditation Program.

During 1994, 43,400 individuals participated in contractor-operated bioassay monitoring programs. Eight of the ten sites included in this review have formalized technical basis documents for their internal dosimetry/bioassay programs, and each program includes some form of quality assurance measures to verify the program's ability to detect intakes of radioactive material. Sufficient contractor personnel and procedural resources have been provided to determine compliance with the dose requirements of 10 CFR 835.

Eight of the ten sites have formalized technical basis documents for their internal dosimetry programs.

STATUS OF PREVIOUS ASSESSMENTS

Overall, the radiological protection internal and external assessment and overview programs conducted by DOE and contractors have been generally adequate. However, action/open items and followup to closure have been less than adequate. At the ten sites reviewed during this assessment, DOE sitewide issue tracking was not in place, or was not effective in providing DOE with up-to-date information on the status of previously identified issues.

The programs reviewed are generally adequate. Sitewide issue tracking would strengthen some ares of observed weakness.

SITE PROFILES

The profiles for the ten sites are presented in matrix form in Appendix A. Specific portions of this material are further developed in graphical form in Appendix B. Individual site radiological protection program profiles for each of the ten sites are provided as Appendix C. The questionnaire used to gather the data included in this profile is provided as Appendix D. Members of the review team are identified in Appendix E.

4.0 CONCLUSIONS

- Radiological protection programs have been developed and are being implemented consistent with industry standards.
- During 1994, workers at the ten sites were adequately protected from exposure to radiation and radioactive materials.
- The number of individuals who receive routine dosimetry far exceeds the number of individuals who would require dosimetry pursuant to 10 CFR 835.402.
- The number of individuals who participate in routine bioassay programs far exceeds the number of individuals who would be required to participate pursuant to 10 CFR 835.402.
- The contractors are the principal resource and the driving force behind the radiological protection programs.

- During 1994, the human resources applied to radiological protection at the contractor level were adequate.

- The 44 DOE radiological protection positions are insufficient to observe and be familiar with the conditions and work practices in the 409 nuclear and 793 radiological facilities at the ten sites.

- The 1994 radiological performance data indicate effective containment of the large inventory of plutonium and uranium present in many of these facilities.

- The 37 million cubic feet of mixed and radiological waste stored at the ten sites is a major challenge to the radiological protection program for the future.

- The work activities conducted at these sites during 1994 are not representative of past mission activities and, with few exceptions, should not be used to project future radiological protection program requirements.

APPENDIX A

MATRIX OF RADIOLOGICAL DATA

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APPENDIX B

GRAPHICAL PRESENTATION OF SPECIFIC DATA RELATIONSHIPS

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APPENDIX C

INDIVIDUAL SITE RADIOLOGICAL PROTECTION PROGRAM PROFILES

Fernald Environmental Management Project C-1
Idaho National Engineering Laboratory C-3
Lawrence Livermore National Laboratory C-5
Los Alamos National Laboratory C-7
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Savannah River C-19

RADIATION PROTECTION SITE PROFILE
FOR THE
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

A. GENERAL SITE OVERVIEW

The Fernald Environmental Management Project (FEMP), formerly a major nuclear weapons material processing facility started in the late 1940s, is currently engaged in decontamination and decommissioning activities. FEMP facilities are managed by the Fernald Environmental Restoration Management Corporation (FERMCO), a subsidiary of Fluor-Daniel for the U.S. Department of Energy (DOE) Fernald Area Office (FAO) and is funded by the Office of Environmental Management (EM). There are currently 12 nuclear and 12 radiological facilities at the site. The most significant radiological hazards include various forms of enriched, natural, and depleted uranium, thorium, and substantial quantities of radon-emitting residual feed material. Machines that produce medical x-rays are also present on site. A total of 589,422 ft^3 of radioactive waste were shipped for disposal in 1994. Approximately 1,287,208 ft^3 of radioactive waste and 83,346 ft^3 of mixed waste remain on site at the end of 1994. The site currently has posted controls, which include radiation areas, high radiation areas, airborne radioactivity areas, and contamination and high contamination areas. It monitors and routinely releases air and waterborne radioactive effluent.

B. RADIATION PROTECTION ORGANIZATION

The FAO has one designated radiological protection position. This position is filled by an individual who, although not certified by the American Board of Health Physics (ABHP) or registered by the National Registry of Radiation Protection Technologists (NRRPT), is eligible to take either certification exam based upon education and/or experience. FERMCO currently has 200 non-hourly designated radiological protection positions. Of these, two are ABHP certified and 25 are registered by NRRPT. The contractor has submitted its radiological protection program to DOE for review as required by 10 CFR 835. The contractor believes that it has achieved 70 percent conditional compliance with 10 CFR 835.

C. PERSONNEL DOSIMETRY

During 1994, the contractor issued permanent personnel dosimeters to 2,837 individuals. It reported that for 1994, 32 individuals received >100 mrems deep dose and none received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was 24 person-rems. The site has a formalized technical basis document on file for its dosimetry/bioassay program. The external dosimetry program is DOE Laboratory Accreditation Program (DOELAP) approved. The internal dosimetry program includes an in-house quality assurance program to confirm the adequacy of its ability to detect uptakes of radioactive material. Adequate procedures and personnel are in place to determine compliance with the dose requirements of 10 CFR 835. In 1994 FERMCO replaced the bioassay contractor for possible falsification of records. Currently, the site bioassay program routinely monitors about 1,595 individuals.

D. ASSESSMENT STATUS

During 1994, four events were reported pursuant to DOE Order 5000.3B as unusual radiological occurrences, and one event was categorized as a radiological emergency.

During the last three years, FEMP has documented 23 internal radiological protection assessments. FAO has documented 67 assessments and DOE Headquarters conducted 10 assessments of the site. Assessments were

generated without a site or DOE tracking system in place to track and monitor for closure of action items. Both the contractor and FAO were unable to verify the closure of assessment action items.

E. PERFORMANCE CONCLUSION

The FEMP radiological protection program strengths are exhibited by the willingness of Radiation Protection Operations to take responsibility for issues and the projection of a positive attitude toward employee radiological protection. Recently-hired radiation protection management personnel bring strength to this area through their experience in the fields of radiation protection and conduct of operations. The new management has also been proactive in correcting radiological problem areas.

Conduct of operations represents the single greatest weakness at FAO. Procedural compliance and first line supervision "buy-in" to this new way of doing business have been slow; however, they are improving.

RADIATION PROTECTION SITE PROFILE
FOR
IDAHO NATIONAL ENGINEERING LABORATORY

A. GENERAL SITE OVERVIEW

The Idaho National Engineering Laboratory (INEL), formerly a major nuclear reactor technology development and test site started in the early 1950s, is currently engaged in energy research, basic science, non-nuclear defense activities, hazardous waste management and research, and environmental remediation. INEL facilities are managed by Lockheed Idaho Technology Company (LITCO) for the Idaho Operations Office (ID). A majority of ID funding is provided by the U.S. Department of Energy (DOE) Office of Environmental Management (EM) and supplemented with funding from the Offices of Energy Research (ER) and Nuclear Energy (NE). There are 19 nuclear facilities at the site. A determination of the number of radiological facilities is in progress. The most significant radiological hazards include various forms of natural, depleted, and enriched uranium, mixed fission and activation products, and tritium. Additional radiation sources include x-ray machines and sealed radiography sources. In 1994, approximately 31,835 ft^3 of radioactive waste was shipped for disposal. There is approximately 191,984 ft^3 of radioactive waste and 6,137 ft^3 of mixed waste on site. Radiologically controlled areas at the INEL include radiation areas, high radiation areas, very high radiation areas, airborne radioactivity areas, and contamination and high contamination areas. INEL facilities routinely release air and waterborne radioactive effluents that are continuously monitored to ensure compliance with local, state and Federal limits.

B. RADIATION PROTECTION ORGANIZATION

The DOE line organization currently has five designated radiological protection positions, of which one of the incumbents is certified by the American Board of Health Physics (ABHP). LITCO has 78 professional radiological protection positions and 168 radiation protection technicians. This group includes seven ABHP certified and 15 National Registry of Radiation Protection Technologists (NRRPT) registered radiological protection positions. LITCO has submitted their radiological protection program for review as required by 10 CFR 835. LITCO believes they have achieved 100 percent conditional compliance with 10 CFR 835.

C. PERSONNEL DOSIMETRY

For 1994, the contractor issued permanent personnel dosimeters to 7,413 individuals. The contractor reported that 488 individuals received >100 mrems deep dose, no individual received >100 mrems committed effective dose equivalent (CEDE), and the collective total effective dose equivalent (TEDE) was 237 person-rems.

The site has a formalized technical basis document on file for its dosimetry/bioassay program and the external dosimetry program is DOE Laboratory Accreditation Program (DOELAP) approved. The internal dosimetry program includes participation in the DOE inter-comparison program and the performance of routine quality control checks to confirm the adequacy of its ability to detect uptakes of radioactive material. Currently, the site bioassay program routinely monitors about 5,879 individuals.

LITCO has adequate people and procedures in place to determine compliance with the dose requirements of 10 CFR 835.

D. ASSESSMENT STATUS

In 1994, four events were reported as unusual radiological occurrences in accordance with DOE Order 5000.3B, and no emergencies reported. Information gathered to date indicates that during the last three years the contractor has documented 25 internal assessments, ID documented eight formal audits, and DOE Headquarters documented four assessments addressing radiological protection. As a result of these reviews, 107 action items were documented by the contractor. As of March 3, 1995, the contractor reports all items closed. The contractor has verified the adequacy of corrective actions in one instance, and DOE has independently verified the adequacy of 62 corrective actions. The status of corrective actions could not be determined in 22 cases. There are more than 40 tracking systems in use at INEL, making followup and closure of issues hard to manage. LITCO and ID are currently working to consolidate all existing systems into one effective issue management system that will provide tracking, trending, and prioritization of identified issues.

E. PERFORMANCE CONCLUSION

ID and LITCO are structured to support implementation of an adequate radiological protection program. The EH residents' surveillance activities and the LITCO fourth quarter Radiological Controls Performance Indicator Report indicate that field implementation of radiological work practices do not consistently support maintaining radiation exposures as low as reasonable achievable. ID has not effectively managed the contractor in resolving previously identified issues, as evidenced by the contractor's inability to accurately track, trend, and prioritize identified issues.

RADIATION PROTECTION SITE PROFILE
FOR
LAWRENCE LIVERMORE NATIONAL LABORATORY

A. GENERAL SITE OVERVIEW

Lawrence Livermore National Laboratory (LLNL) is a nuclear weapons design laboratory, started in the 1950s. LLNL is currently engaged in weapons research, arms control, energy research, basic science, biomedicine, non-nuclear defense activities, fusion research, uranium enrichment, and environmental remediation. LLNL is managed by the University of California for the U.S. Department of Energy (DOE) Oakland Operations Office and primarily funded by the Office of Defense Programs (DP). There are currently seven nuclear and 60 radiological facilities on the site. The most significant radiological hazards include various forms of plutonium; natural, depleted, and enriched uranium; thorium; mixed fission products; and tritium. Accelerators and machines that produce x-rays, as well as sealed radiography sources, are also operated on site. About 57,746 ft^3 of low-level radioactive waste was shipped for disposal in 1994, and approximately 52,745 ft^3 of radioactive waste and 26,582 ft^3 of mixed waste remain on site. The site currently has established posted controls, which include radiation areas, high radiation areas, very high radiation areas, and contamination and high contamination areas. It monitors and routinely releases air and waterborne radioactive effluents.

B. RADIATION PROTECTION ORGANIZATION

The DOE line organization currently has four designated radiological protection positions. Two are assigned full time to LLNL, and two spend about ten percent of their time on LLNL activities. The senior position is filled by individual who, although not certified by the American Board of Health Physics (ABHP) or registered by the National Registry of Radiation Protection Technologists (NRRPT), would be eligible based on education and experience to apply for certification. One ABHP certified health physicist is expected to join the DOE staff shortly. The contractor currently has 17 professional and 38 technician positions. Of this group, seven are ABHP certified and five are registered by the NRRPT. The contractor has submitted its radiological protection program for review as required by 10 CFR 835. At this time, the contractor believes it has achieved 85 percent compliance with the requirements of 10 CFR 835 for its nuclear facilities and 40 percent for its radiological facilities.

C. PERSONNEL DOSIMETRY

During 1994, the contractor issued permanent personnel dosimeters to 8,702 individuals. It reported that for 1994, 40 individuals received >100 mrems deep dose and two received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was 18.7 person-rems and was down from about 30 in 1992 and 1993. The site does not have a formalized technical basis document on file for its dosimetry/bioassay program. The external dosimetry program is DOE Laboratory Accreditation Program (DOELAP) approved. The internal dosimetry program includes participation in the DOE inter-comparison program and the performance of routine quality control checks to confirm the adequacy of its ability to detect uptakes of radioactive material. They have adequate people and procedures in place to determine compliance with the dose requirements of 10 CFR 835. Currently, the site bioassay program routinely monitors about 850 individuals.

D. ASSESSMENT STATUS

During 1994, no events were reported pursuant to DOE Order 5000.3B as either unusual radiological occurrences or emergencies.

During the last three years, the contractor has documented one internal assessment of radiological protection. DOE line management has documented three audits, and DOE Headquarters documented one assessment addressing radiological protection. The former Office of Nuclear Safety also documented one evaluation during this three-year period. As a result of these activities, 70 action items were documented by the contractor. As of March 24, 1995, the contractor reports that 12 remain open. The contractor has verified the adequacy of corrective actions in 38 instances, but DOE has not independently verified the adequacy of corrective actions for any cases.

E. PERFORMANCE CONCLUSION

LLNL is a research-oriented facility that has effectively controlled the wide range of radiation hazards present. The laboratory has long used a matrix management approach to accomplish its mission. This technique drives safety responsibility to project line management rather than vesting it with a centralized safety department. In the area of health physics, its strength is its people. The health physics professionals are highly credentialed, very experienced, and recognized by their peers. The health and safety technologists enjoy a similar reputation. The bioassay and laboratory equipment is state of the art. Management is clearly committed to safety, yet reluctant to expend its resources to control the public perception of risk associated with radiation exposure. Most adverse findings in the radiological controls area involve conduct of operations and a lack of formality.

The Oakland Operations Office has provided radiological controls expertise in monitoring implementation of the Department's expectations. This involvement has not been heavily documented, nor is it clear that it resulted in substantial change in the contractor's performance.

RADIATION PROTECTION SITE PROFILE
FOR
LOS ALAMOS NATIONAL LABORATORY

A. GENERAL SITE OVERVIEW

Los Alamos National Laboratory (LANL) is a nuclear weapons design laboratory started in the early 1940s. LANL is managed and operated by the University of California for the U.S. Department of Energy (DOE) Los Alamos Area Office (LAAO) of the Albuquerque Operations Office. The laboratory's current mission is in the areas of nuclear weapons research and development, with special emphasis on nuclear weapons nonproliferation, space project research and development, energy research projects, and biological-medical research. LANL is primarily funded by the Office of Defense Programs (DP) and receives additional funding from the Offices of Environmental Management, Energy Research, and Nuclear Energy; the Department of Defense; and others.

LANL currently consists of 42 active Technical Areas. These Technical Areas include a nuclear reactor (shut down); criticality experiment areas; particle, neutron and ion accelerators; sealed source and x-ray radiography facilities; research laboratories; depleted uranium and explosive test facilities; radioactive waste and mixed waste storage facilities; radiologically contaminated environmental areas in various stages of remediation; and decontamination and decommissioning projects. The laboratory has nine nuclear facilities and 72 radiological facilities. The square footage of contamination within these facilities that exceeds the surface contamination levels of DOE Radiological Control Manual, Article 222, Table 2-2, is not tracked by LANL. LANL currently has established posted controls, which include radiation areas, high radiation areas, very high radiation areas, and high contamination areas. LANL routinely releases and monitors airborne and waterborne radioactive effluent. In 1994, approximately 102,120 cubic feet of radioactive waste were shipped for disposal, and approximately 123,218 cubic feet of packaged low level radioactive waste and 291,229 cubic feet of mixed waste remain stored on site at this time.

B. RADIATION PROTECTION ORGANIZATION

The DOE line organization currently has one permanently assigned radiological protection position (health physicist) and one full time radiological protection contractor. Neither person is certified by the American Board of Health Physics (ABHP) or registered by the National Registry of Radiation Protection Technologists (NRRPT), although they are eligible based on their education and/or experience to apply to take either exam. The laboratory currently has 67 professional and 189 radiological protection hourly technician positions. Of this group, 16 are ABHP certified and 27 are registered by the NRRPT.

The laboratory has submitted its radiological protection program as required by 10 CFR 835 for review. The laboratory believes it has achieved 39 percent full compliance and 45 percent conditional and/or partial compliance with the requirements of 10 CFR 835.

C. PERSONNEL DOSIMETRY

During 1994, the laboratory issued permanent personnel dosimeters to 8,859 individuals. For 1994, the laboratory reported that approximately 342 personnel received >100 mrems deep dose, and that one person received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was 183 person-rems. Also, for 1994, no personnel exceeded the personnel exposure limits of 10 CFR 835 or DOE Order 5480.11.

The laboratory has technical basis documents on file for both their external dosimetry and their internal dosimetry/bioassay programs. Both programs include quality assurance measures to confirm the adequacy of the ability to monitor personnel for exposure to radiation and to detect intakes of radionuclides. The laboratory has adequate staff and sufficient procedures in place to determine compliance with the radiation exposure requirements of 10 CFR 835. Currently the laboratory bioassay program routinely monitors 3,000 individuals.

D. ASSESSMENT STATUS

During 1994, two events were reported pursuant to DOE Order 5000.3B as unusual radiological occurrences and none as emergencies.

During the last three years, the laboratory has documented seven internal assessments of radiological protection. DOE line management (LAAO and Albuquerque Operations Office) has documented 15 audits, DOE Headquarters has documented three audits, and the Defense Nuclear Facilities Safety Board has issued five trip reports addressing radiological controls. As a result of these audits, 30 findings were identified; 70 action items were documented by the laboratory, of which 14 findings have been closed. Of the seven laboratory internal assessments on radiological controls, only one has been completely closed. Of the 15 DOE line management audits, only one was submitted to the laboratory and entered into the Audits and Assessment database for corrective actions and tracking.

E. PERFORMANCE CONCLUSION

The contractor implemented an adequate radiological protection program during 1994. The need for additional contractor management involvement is indicated by recurring deficiencies, declining building status, mission changes, and projected workforce restructuring. The strength of the radiation protection program is vested in the high level of expertise of the professional staff. Both the external and internal dosimetry programs are considered strong. The as-low-as-reasonably-achievable (ALARA) program has also been recognized as a strength at Technical Areas 53 and 54. Weaknesses in implementation of radiological controls are due, in part, to a lack of ownership by line management and a lack of involvement by staff health physicists. Followup and correction of identified deficiencies are also considered weaknesses. Management of radioactive wastes also indicates the need for additional management attention.

LAAO has been minimally involved in assuring the quality of the contractor's radiation protection program. LAAO recently hired a health physicist; however, no significant changes have yet been identified. Health physics oversight has been accomplished by use of resident contract health physicists and occasional visits by individuals from the Albuquerque Operations Office. LAAO involvement in tracking and closure of radiological protection issues has been marginal.

RADIATION PROTECTION SITE PROFILE
FOR
OAK RIDGE

A. GENERAL SITE OVERVIEW

The Oak Ridge complex is currently engaged in weapons dismantlement, energy research, basic science, biomedicine, non-nuclear defense activities, hazardous waste research and management, uranium enrichment, and environmental remediation. For the purpose of this review, only the defense nuclear facilities reporting to the U.S. Department of Energy (DOE) Oak Ridge Operations Office (OR) were considered. Therefore, the facilities addressed in this review include the Y-12 Plant, the Oak Ridge National Laboratory (ORNL), and the K-25 Plant. Oak Ridge complex facilities are managed by Martin Marietta Energy Systems (MMES) for OR. In addition, MK Ferguson-Oak Ridge Company (MKF) serves as the construction management contractor for the Oak Ridge complex. Oak Ridge complex funding is predominantly from the Office of Environmental Management (EM), but funding is also provided by Office of Defense Programs (DP) and Energy Research (ER). There are currently 100 nuclear and 261 radiological facilities at the site. The most significant radiological hazards include various forms of plutonium; natural, depleted, and enriched uranium; thorium; mixed fission and activation products; and tritium. Nuclear reactors, accelerators, and machines that produce x-rays, as well as sealed radiography sources, are also operated or used on site. In 1994, there were 84, 688 ft^3 of radioactive waste shipped for disposal, and 1,257,550 ft^3 of radioactive waste and 5,228,430 ft^3 of mixed waste remained on site at the end of 1994. The site has established posted controls, which include radiation areas, high radiation areas, very high radiation areas, airborne radioactivity areas, and high contamination areas. It monitors and routinely releases airborne and water-borne radioactive effluents.

B. RADIATION PROTECTION ORGANIZATION

OR currently has 12 designated radiation protection positions. Eight personnel are assigned full time to OR's Safety and Health Division in a matrix support function to the line organizations, and are on call to DOE line management. Three radiation protection personnel are assigned to line management functions at DOE site offices. Two of the individuals currently filling these positions are certified by the American Board of Health Physics (ABHP), and none are registered by the National Registry of Radiation Protection Technologists (NRRPT). Oak Ridge contractors currently have 337 salaried and 98 hourly positions. Of this group, 14 are ABHP certified and 44 are registered by the NRRPT. The contractor has submitted its radiological protection program for DOE's review as required by 10 CFR 835. As of March 31, 1995, MMES stated that Y-12, ORNL, and K-25 were in conditional compliance with their radiation protection plans at levels of 79 percent, 30 percent, and 90 percent respectively. MKF has stated that it is in 100 percent conditional compliance with its radiation protection plan.

C. PERSONNEL DOSIMETRY

During 1994, Oak Ridge contractors issued permanent personnel dosimeters to 21,300 individuals. They reported that for 1994, 191 individuals received >100 mrems deep dose and one received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was 72.2 person-rems. The site has a formalized technical basis document on file for its dosimetry/bioassay program. The external dosimetry program is DOE Laboratory Accreditation Program (DOELAP) approved. The internal dosimetry program includes contractor participation in the DOE inter-comparison program and the performance of routine quality control checks to confirm the adequacy of its ability to detect uptakes of radioactive material. Adequate procedures and personnel are in place to determine compliance with the dose requirements of 10 CFR 835. Currently, the site bioassay programs routinely monitor about 4,250 individuals.

D. ASSESSMENT STATUS

During 1994, one event was reported pursuant to DOE Order 5000.3B as an unusual radiological occurrence, and no radiological emergencies were reported.

During the last three years, the contractor has documented one internal assessment and 14 audits/surveillances of radiological controls in the Oak Ridge complex. DOE line management has documented 15 assessments and 23 audits/surveillances, and DOE Headquarters (including the former Office of Nuclear Safety) documented seven assessments and two audits/surveillances addressing radiological controls. As a result of these activities, approximately 245 findings were documented, of which 122 remain open, 56 are closed, and 41 remain for which the status could not be determined.

E. PERFORMANCE CONCLUSION

Numerical performance data for Oak Ridge result from radiation protection activities at ORNL, K-25, and Y-12, operated by Martin Marietta Energy Systems, and activities of the construction manager, MKF.

Strength was noted in the quality of radiation protection program procedures developed and maintained by all Oak Ridge contractors. Good performance was demonstrated by the K-25 contractor in the areas of internal and external exposure control, radwaste management, management involvement in assuring quality, and followup of identified deficiencies. Contractor radiation protection staffing at all sites was deemed adequate to meet current mission needs and objectives. Weaknesses were noted at Y-12 in the areas of radwaste management, contractor management involvement in assuring quality, and followup to identified deficiencies; however, an improving trend was noted at Y-12 with the addition of a new Radiation Protection Manager, additional funding, radiation protection equipment procurement, and a commitment to the conduct of radiological operations.

OR's involvement in assuring radiation protection program quality at Oak Ridge complex facilities has been generally adequate. DOE line management involvement was noted as a strength at ORNL and K-25. However, OR's oversight program for ORNL has been adversely impacted by the necessity for assignment of one staff health physicist to 10 CFR 835 implementation duty. During the period, the absence of a full-time DOE health physicist at Y-12 adversely impacted DOE's oversight of the contractor's followup of previously identified radiation protection issues, and contributed to the lack of full MMES commitment in the areas of conduct of radiological operations and radiation protection operations support. Improving trends were noted at Y-12 and the DOE Engineering Services Division with the addition of health physicists to the DOE line program staffs.

RADIATION PROTECTION SITE PROFILE
FOR
PANTEX PLANT

A. GENERAL SITE OVERVIEW

The Pantex Plant is the primary facility in the U.S. for the assembly, disassembly, and stockpile maintenance of war reserve nuclear weapons. The Pantex Plant is managed by Mason & Hanger-Silas Mason for the U.S. Department of Energy (DOE) Amarillo Area Office for the Albuquerque Operations Office and is primarily funded by the Office of Defense Programs (DP). There are currently five nuclear and 50 radiological facilities on the site. The most significant radiological hazards include various forms of natural, depleted, and enriched uranium; plutonium; thorium; and tritium. Machines that produce x-rays and neutrons, as well a cobalt-60 radiography source, are also used on site. In 1994, there were 8,731 ft^3 of radioactive waste shipped for disposal, and approximately 10,681 ft^3 of radioactive waste and 5,157 ft^3 of mixed waste remained on site at the end of 1994. The site currently has established posted controls, which include radioactive materials areas, radiation areas, and contamination control areas. It monitors and routinely releases airborne radioactive effluents.

B. RADIATION PROTECTION ORGANIZATION

The DOE line organization currently has one designated radiological protection position. This position is filled by an individual who, although not certified by the American Board of Health Physics (ABHP) or registered by the National Registry of Radiation Protection Technologists (NRRPT), would be eligible based on education and experience to apply for certification. The principal contractor currently has 23 professional and 41 radiation protection technician positions. Of this group, four are ABHP certified and nine are registered by NRRPT. The contractor has submitted its radiological protection program as required by 10 CFR 835 for review. At this time the contractor believes it has achieved 70 percent compliance with the requirements of 10 CFR 835.

C. PERSONNEL DOSIMETRY

During 1994, the contractor issued permanent personnel dosimeters to 2,962 individuals. It reported that for 1994, 74 received >100 mrems deep dose, and none received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was 29 person-rems. The site has a technical basis document on file for its dosimetry/bioassay program. The program includes quality assurance measures to confirm the adequacy of its ability to detect intakes of radioactive material. The program has adequate people and procedures in place to determine compliance with the dose requirements of 10 CFR 835. Currently, the site requires monitoring of 15 individuals.

D. ASSESSMENT STATUS

During 1994, three radiological events were reported pursuant to DOE Order 5000.3B as unusual radiological occurrences, and none as emergencies.

During the last three years, the contractor has documented two internal assessments of radiological protection. DOE Headquarters has documented six and the Albuquerque Operations Office one assessment involving radiological protection. In addition, the Defense Nuclear Facilities Safety Board issued four trip reports addressing radiological protection. As a result of these audits, 77 action items were documented by the contractor. As of April 3, 1995, the contractor reports that 34 remain open and one item remains indeterminate. The contractor has verified the adequacy of corrective actions in 39 instances, and DOE has independently verified the adequacy of corrective actions in five cases.

E. PERFORMANCE CONCLUSION

The contractor has established an adequate radiation protection program for handling and storage of radioactive materials. The program has been improving; however, implementation difficulties related to worker skills involving contamination control, use of protective equipment, and control of radioactive material continue to occur. The work planning does not fully integrate radiological engineering and radiological protection early in the process. These problems seem rooted in a lack of line management ownership of the radiological protection program and a training program that does not focus on practical skills.

The DOE Amarillo Area Office was not adequately involved in assuring quality in the radiological protection area for most of 1994. Late in the year a radiation protection manager was hired, and the services of a experienced contractor were made available. There are indications that the level of DOE management involvement in the radiological protection area is improving.

RADIATION PROTECTION SITE PROFILE
FOR
HANFORD

A. GENERAL OVERVIEW

Hanford, formerly a major nuclear weapons materials production and processing site started in the mid-1940s, is now primarily an Environmental Management program site that is involved in decontamination, decommissioning, and environmental restoration of U.S. Department of Energy (DOE) facilities. The primary management and operating contractor, Westinghouse Hanford Corporation, manages the site for the DOE Richland Operations Office. There are currently 15 nuclear and 320 radiological facilities at Hanford. The most significant radiological hazards include various forms of natural, depleted, and enriched uranium; mixed fission/activation products; plutonium; thorium; and tritium. The site also contains machines that produce x-rays and neutrons. In 1994, Hanford's radioactive waste program shipped 37,486.2 ft^3 of low-level radioactive waste for disposal. There were approximately 39,824.7 ft^3 of packaged radioactive waste and 252,651.9 ft^3 of mixed waste in onsite storage at the end of 1994. The site currently has established posted radiological controls for radiation areas, high radiation areas, very high radiation areas, airborne radioactivity areas, and high contamination areas, as well as airborne and liquid radioactive effluent. The site has a routine monitoring program for effluent discharges.

B. RADIATION PROTECTION ORGANIZATION

The DOE line organization currently has five designated radiological protection positions. None of the five are certified by the American Board of Health Physics (ABHP), although the Radiological Protection Manager (RPM) is registered by National Registry of Radiation Protection Technologists (NRRPT). The RPM has also applied to take the ABHP certification examination. The three main contractors on site have 186 professional health physicists and 499 radiation protection technicians. Of these, 26 are ABHP certified and 96 are registered by NRRPT. The contractors have submitted their radiological protection programs for review as required by 10 CFR 835. The contractors believe they have achieved the following percentages of full compliance: Westinghouse Hanford Corporation, 57 percent; Pacific Northwest Laboratory, 62 percent; Bechtel Hanford, Inc., 79.6 percent.

C. PERSONNEL DOSIMETRY

The personnel dosimetry program includes requirements for radiation medical examinations, radiological control training, and an understanding of the risks associated with occupational radiation exposure.

During 1994, the contractors issued permanent personnel dosimeters to 11,197 individuals. In 1994, the contractor reported that 518 persons had received >100 mrems deep dose, and three others had received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was 213 person-rems. The site maintains a formalized technical basis document for its dosimetry/bioassay program. The external dosimetry program is DOE Laboratory Accreditation Program (DOELAP) approved. The internal dosimetry program includes quality assurance measures to confirm the adequacy of its ability to detect intakes of radioactive material. Adequate people and procedures are in place to determine compliance with the dose requirements of 10 CFR 835. Currently, the site bioassay program monitors about 10,000 individuals.

D. ASSESSMENT STATUS

During 1994, there were no reported radiological emergencies, and a total of 29 unusual radiological occurrences were reported pursuant to DOE Order 5000.3B.

During the last three years, the contractors have documented 14 internal assessments of radiological protection. DOE line management has documented 30 assessments, and DOE Headquarters has documented one assessment addressing radiological protection. The former Office of Nuclear Safety radiological evaluation group documented three evaluations during this three year period, and the Defense Nuclear Facilities Safety Board issued two trip reports addressing radiological protection. The former Offices of Nuclear Safety (EH-14 and EH-30.3) documented 24 pre-decisional surveillances during the three year period. As a result of these activities, 98 action items were documented. As of March 1995, the contractor reports that 65 remain open. The contractor has verified the adequacy of corrective actions in 28 instances, and DOE has independently verified the adequacy of 19 corrective actions.

E. PERFORMANCE CONCLUSION

Hanford is a research and waste management site that is structured to support implementation of an effective radiological protection program; however, field implementation of radiological work practices does not consistently support maintaining radiation exposures as low as reasonably achievable.

Hanford's dose data indicate that the radiation protection program is operating in a reasonable manner, but recurring weaknesses indicate that additional DOE line management involvement is needed to close out previously identified findings and to correct problem areas that reoccurrence. Weaknesses were identified in DOE's management of the contractor to improve the conduct of radiological operations at the site. For example, contractor performance weaknesses persist in contamination and personnel exposure controls, radiological work practices, radiological surveys, posting and control, and administrative areas. In addition, analysis of dosimetry and bioassay data indicated that 4 percent of the total personnel assigned permanent personnel dosimeters (deep dose 100 mrems) were required by 10 CFR 835.402 and 0.1 percent of DOE and contractor personnel were identified as requiring bioassay.

RADIATION PROTECTION SITE PROFILE
FOR
ROCKY FLATS

A. GENERAL SITE OVERVIEW

Rocky Flats' original mission was to manufacture nuclear weapons components and recover plutonium scrap and residues. The site is currently engaged in plutonium storage, facilities decontamination, decommissioning, and environmental restoration. Although Rocky Flats is currently managed by EG&G-Rocky Flats for the U.S. Department of Energy (DOE) Rocky Flats Field Office (RFFO), a new contractor (Kaiser-Hill) is expected by July 1995. There are currently 28 nuclear and seven radiological facilities on the site. The most significant radiological hazards include various forms of plutonium; natural, depleted, and enriched uranium; thorium; and tritium. About 14,910 ft^3 of radioactive waste was shipped for disposal in 1994, and approximately 202,145 ft^3 of packaged radioactive waste and 404,296 ft^3 of mixed waste remain on site. The site currently has established posted controls, which include radiation areas, high radiation areas, airborne radioactive radioactivity areas, and contamination and high contamination areas. It monitors and routinely releases airborne and waterborne radioactive effluents.

B. RADIATION PROTECTION ORGANIZATION

The DOE line organization currently has six designated radiological protection positions. None of the six are certified by the American Board of Health Physics (ABHP) or registered by the National Registry of Radiation Protection Technologists (NRRPT). However, the senior position is filled by an individual who would be eligible based on education and experience to apply for certification. The contractor currently has 169 non-hourly and 402 hourly radiation protection positions. Of this group, three are ABHP certified and 44 are registered by the NRRPT. The contractor has submitted its radiological protection program for review as required by 10 CFR 835. At this time, the contractor believes it has achieved 30 percent compliance with the requirements of 10 CFR 835.

As a part of the Rocky Flats National Conversion Pilot Project, MSC Corp. will be utilizing Building 883 for recycling and commercial reuse of depleted uranium. MSC Corp. has not submitted a separate radiation protection program, and it has not been resolved whether a separate one is required.

C. PERSONNEL DOSIMETRY

During 1994, the contractor issued permanent personnel dosimeters to 4,920 individuals. It reported that for 1994, a total of 478 individuals received >100 mrems deep dose and four received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was 206 person-rems. The site has a formalized technical basis document on file for its dosimetry/ bioassay program. The external dosimetry program is DOE Laboratory Accreditation Program (DOELAP) approved. The internal dosimetry program includes audits and routine quality control checks to confirm the adequacy of its ability to detect uptakes of radioactive material. Adequate people and procedures are in place to determine compliance with the dose requirements of 10 CFR 835. Currently, the site bioassay program routinely monitors about 2,760 individuals.

D. ASSESSMENT STATUS

During 1994, 37 events were reported pursuant to DOE Order 5000.3B as unusual radiological occurrences; no emergency events were reported. The majority of these events were related to spills and or the identification of radioactive contamination in excess of area limits.

During the last three years, the contractor documented 23 internal assessments of radiological protection. RFFO documented six assessments and also conducted 59 smaller scope surveillances during the period. DOE Headquarters documented six assessments addressing radiological protection. The former Office of Nuclear Safety documented one evaluation during this three-year period. The Defense Nuclear Facilities Safety Board also documented two reports involving radiological protection. As a result of these activities, 96 action items were documented by the contractor. As of March 24,1995, the contractor reports that 41 remain open. The contractor has verified the adequacy of corrective actions in 34 instances, and DOE has independently verified the adequacy of eight corrective actions.

E. PERFORMANCE CONCLUSION

The contractor implemented an adequate radiation protection program during 1994. The need for additional management involvement is indicated by recurring deficiencies, declining building status, mission changes, and projected workforce restructuring.

The senior staff of the Radiation Protection organization is talented and experienced. Radiological control technician (RCT) staffing levels were adequate, but hampered by deficiencies in work planning and RCT utilization. Workforce reductions have resulted in the replacement of qualified RCTs by unqualified yet senior union employees; additional layoffs are projected and could seriously impact the RCT knowledge base.

Contractor line management acceptance of responsibility for implementing and improving the radiation protection program has been a weakness through the period. Audits and occurrence reports identify recurring problems in worker radiological performance, posting, surveys, and Radiation Work Permit use. Decontamination or stabilization of gloveboxes and work areas has not been aggressively pursued, resulting in spread of contamination, increased survey requirements, and heavy reliance on respiratory protection.

RFFO staff are generally knowledgeable of site activities and emergent issues related to radiation protection. The level of RFFO management involvement in assuring quality has been significantly reduced over the past year, to reflect a change in the RFFO Health Physics Division's role from oversight to technical support.

RADIATION PROTECTION SITE PROFILE
FOR
SANDIA NATIONAL LABORATORIES

A. GENERAL SITE OVERVIEW

Sandia National Laboratories (SNL) is a multi-program diverse laboratory complex with facilities at Albuquerque, New Mexico; Livermore, California; and near Tonopah, Nevada. For the purpose of this profile, only the Albuquerque site is discussed. The primary mission of SNL was the development of the non-nuclear portions of nuclear weapons systems (militarization). SNL also conducts research and development of strategic weapons defense systems, arms control, basic energy research, basic science, non-nuclear defense activities, fusion research, and environmental remediation. SNL is managed by Martin Marietta Energy Systems (MMES) for the U.S. Department of Energy (DOE) Albuquerque Operations Office and is primarily funded by the Office of Defense Programs (DP). There are currently 10 nuclear and 100 radiological facilities on the site. The most significant radiological hazards include various forms of plutonium; natural, depleted, and enriched uranium; thorium; mixed fission products; and tritium. Accelerators and machines that produce x-rays, as well as nuclear reactors, are also operated on site. While no radioactive waste was shipped for disposal in 1994, a total of 472 ft^3 of mixed waste was shipped for disposal, and approximately 10,523 ft^3 of radioactive waste and 2287 ft^3 of mixed waste remained on site at the end of 1994. The site currently has established posted controls, which include radiation areas, high radiation areas, very high radiation areas, and high contamination areas. It routinely releases airborne and waterborne radioactive effluents.

B. RADIATION PROTECTION ORGANIZATION

The DOE line organization currently has one designated radiological protection position. The individual currently filling the position is certified by the American Board of Health Physics (ABHP). The contractor currently has 34 professional and 48 technician positions. Of this group, seven are ABHP certified and 19 are registered by the National Registry of Radiation Protection Technologists (NRRPT). The contractor has submitted its radiological protection program for review as required by 10 CFR 835. At this time the contractor believes it has achieved 17 percent compliance with the requirements of 10 CFR 835 and the DOE Radiological Control Manual.

C. PERSONNEL DOSIMETRY

During 1994, the contractor issued permanent personnel dosimeters to 3,856 individuals. It reported that for 1994, seven individuals received >100 mrems deep dose and none received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was eight person-rems. The site does not have an approved formalized technical basis document on file for its internal dosimetry/bioassay program. The external dosimetry program is DOE Laboratory Accreditation Program (DOELAP) approved. The internal dosimetry program includes the use of blind spikes and the performance of routine quality control checks to confirm the adequacy of its ability to detect uptakes of radioactive material. SNL does not have adequate people and procedures in place to determine compliance with the dose requirements of 10 CFR 835. Currently, the site bioassay program routinely monitors about 50 individuals.

D. ASSESSMENT STATUS

During 1994, two events were reported pursuant to DOE Order 5000.3B as unusual radiological occurrences. Although outside the time focus of this report, one of the unusual radiological occurrences was subsequently upgraded in early 1995 to a radiological site area emergency.

During the last three years, the contractor has documented two internal assessments of radiological protection. DOE line management has documented four audits. The former Office of Nuclear Safety also documented one evaluation during this three year period. As a result of these activities, 91 action items were documented by the contractor. As of March 24, 1994, the contractor reports that all items remain open.

E. PERFORMANCE CONCLUSION

SNL is a research and development oriented facility that has, for the most part, adequately controlled the wide range of radiation hazards present, using a line management approach to accomplish its mission. This technique drives safety responsibility to a centralized safety department. Implementation of an effective radiological protection program at SNL has been hampered by the lack of adequate management attention and direction. The Albuquerque Operations Office and the DOE Kirtland Area Office are responsible for monitoring implementation of the Department's expectations. The Kirtland Area Office has recently filled a long vacant health physics position, and improvement has been noted. Most adverse findings in the radiological controls area involve training of personnel, conduct of operations, posting and labeling, program basis documentation, and lack of formalized procedures. All previously identified findings in the radiological protection area remain open.

RADIATION PROTECTION SITE PROFILE
FOR
SAVANNAH RIVER

A. GENERAL SITE OVERVIEW

The Savannah River Site (SRS), formerly a major nuclear weapons materials production and processing site starting in the late 1940s, is primarily an Environmental Management (EM) site currently engaged in high-level waste management, energy research, basic science, biomedicine, non-nuclear defense activities, hazardous waste management and environmental remediation. SRS facilities are managed by Westinghouse Savannah River Company (WSRC) for the U.S. Department of Energy (DOE) Savannah River Operations Office (SR). SRS funding is predominantly from EM, but funding is also provided by the Offices of Defense Programs (DP) and Energy Research (ER). There are currently 204 nuclear and 11 radiological facilities at the site. The most significant radiological hazards include various forms of plutonium; natural, depleted, and enriched uranium; thorium; mixed fission and activation products; and tritium. Reactors, machines that produce x-rays, and sealed radiography sources are also operated on site. No radioactive waste was shipped for disposal in 1994. Approximately 287,000 ft^3 of packaged radioactive waste and 150 ft^3 of mixed waste remain on site. The site currently has established posted controls, which include radiation areas, high radiation areas, very high radiation areas, airborne radioactivity areas, and contamination and high contamination areas. It monitors and routinely releases airborne and waterborne radioactive effluent.

B. RADIATION PROTECTION ORGANIZATION

The DOE line organization (SR) has nine designated radiological protection positions. None of the nine are certified by the American Board of Health Physics (ABHP) or registered by the National Registry of Radiation Protection Technologists (NRRPT). However, the senior position is filled by an individual who would be eligible, based on education and experience, to apply for certification. Each of the nine SR radiation protection personnel spend an average of 250 days at the site conducting radiological assignments. WSRC currently has 604 hourly and 203 non-hourly designated radiological protection positions. Of these, 10 are ABHP certified and six are registered by NRRPT. The contractor has submitted their radiological protection program to DOE for review as required by 10 CFR 835. The contractor believes that they have achieved 65 percent conditional compliance with 10 CFR 835.

C. PERSONNEL DOSIMETRY

During 1994, the contractor issued permanent personnel dosimeters to 12,810 individuals. It reported that for 1994, 720 individuals received >100 mrems deep dose and one received >100 mrems committed effective dose equivalent (CEDE). The 1994 collective total effective dose equivalent (TEDE) was 311 person-rems. The site has a formalized technical basis document on file for its dosimetry/bioassay program. The external dosimetry program is DOE Laboratory Accreditation Program (DOELAP) approved. The internal dosimetry program includes blind spike samples in house, and quality assurance audits to confirm the adequacy of its ability to detect uptakes of radioactive material. Adequate procedures and personnel are in place to determine compliance with the dose requirements of 10 CFR 835. Currently, the site bioassay program routinely monitors about 24,000 individuals.

D. ASSESSMENT STATUS

During 1994, 16 events were reported pursuant to DOE Order 5000.3B as unusual radiological occurrences, and no radiological emergencies were reported.

During the last three years, SR has documented 33 internal radiation protection assessments. As a result of these assessment activities, 354 action items were generated. Of these, both the contractor and SR have verified the closure of 287 items, with 67 remaining open.

E. PERFORMANCE CONCLUSION

The SRS radiological protection program strengths are exhibited by the willingness of Radiation Protection Operations to take responsibility for issues and the projection of a positive attitude toward employee radiological protection. Recently-hired radiological protection management personnel bring strength to this area through their experience in the fields of radiological protection and conduct of operations. The new management has also been proactive in the correction of radiological problem areas.

Conduct of operations represents the single greatest weakness at SRS. Procedural compliance and first line supervision "buy-in" to this new way of doing business have been slow; however, they are improving.

APPENDIX D

1994 DATA SUMMARY QUESTIONNAIRE

1994 DATA SUMMARY QUESTIONNAIRE

The following EH Residents collected the information listed below:

Idaho - Gene Balsmeier
Fernald - Bill Harrison
Oak Ridge - Brenda Holder
LANL, SNL - Rick Johnson
Pantex - Robie Monroe
Richland - Jeanie Polehn
Savannah River - Brenda Pope
Rocky Flats - Tony Weadock
LLNL - Greg Yuhas

FOR CONTRACTORS -

1. TEDE Person-rem:

2. Number of permanently assigned personnel dosimeters:

3. Number of personnel doses greater than 100 mrem:

4. Number of personnel with CEDE greater than 100 mrem:

5. Number of non-hourly radiation protection positions:

6. Number of ABHP-certified health physicists:

7. Number of hourly radiological protection positions:

8. Number of personnel certified by NRRPT or state x-ray certification:

9. Number of personnel skin contaminations greater than the levels stated in Article 221, Table 2-2 of the RCM:

10. Number of square feet of inside areas with surface contamination greater than the levels specified in Article 222, Table 2-2, as of December 31, 1994:

11. Cubic feet of radioactive waste shipped for disposal in 1994:

12. Cubic feet of radioactive waste stored onsite as of December 31, 1994:

13. Cubic feet of mixed waste stored onsite as of December 31, 1994:

14. Number of nuclear facilities (DOE 5480.5 definition):

15. Number of radiological facilities exclusive of facilities counted in #14:

16. Number of ORPS unusual radiological occurrence reports in 1994:

17. Number of ORPS emergency radiological occurrence reports in 1994:

18. Plutonium handled? 18a. Dispersable?

19. Enriched Uranium handled? 19a. Dispersable?

20. Natural U or Thorium? 20a. Dispersable?

21. Depleted U handled? 21a. Dispersable?

22. Mixed fission/activation products? 22a. Dispersable?

23. Tritium? 23a. Dispersable?

24. X-ray machines? 24a. Sealed source radiography?

25. Accelerators?

26. Reactors?

27. Radiation areas?

28. High radiation areas?

29. Very high radiation areas?

30. Airborne radioactivity areas?

31. High contamination areas?

32. Airborne radioactive effluents?

33. Liquid radioactive effluents?

FOR DOE AT THE SITES -

34. Planned special exposures in 1994?

35. Number of individuals provided with permanently assigned whole body dosimetry:

36. Number with 1994 deep dose greater than 100 mrem:

37. Number with CEDE greater than 100 mrem:

38. Number of radiological protection positions with NRRPT certification:

39. Number of ABHP-certified health physicists:

40. Number of radiological protection positions with NRRPT certification:

41. In 1994, how many total person-days does DOE state that each radiological protection position spent at the site conducting radiological assignments?

42. Does the site have a technical basis document on file for the internal dosimetry/bioassay program? (Ref: RCM 522.1)

43. What Quality Assurance has been performed to confirm the continuing ability of the bioassay programs to detect DILs for the radioisotopes present at the site? (Ref: 10 CFR 835.402(d))

44. How many people require bioassay monitoring? (Ref: RCM 522.2 and 522.5)

45. Does the site have in place adequate people and procedures to determine compliance with the dose requirements of 10 CFR 835 and/or DOE 5480.11? (Ref: G-10 CFR 835/C1, Rev. 1, Internal Dosimetry)

46. Did any personnel exposures exceed the limits specified in 10 CFR 835.202 or DOE 5480.11(9)(b)?

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APPENDIX E

TEAM COMPOSITION

APPENDIX E

TEAM COMPOSITION

Deputy Assistant Secretary, Oversight:	Glenn S. Podonsky
Associate Deputy Assistant Secretary:	Neal Goldenberg
Director, Office of EH Residents:	Oliver D.T. Lynch, Jr.
Task Team Members:	Oliver D.T. Lynch, Jr., Task Leader William T. Cooper, Jr. Lacynda J. Foreman James C. Howland Jerome B. Martin David M. Rohrer Gregory P. Yuhas

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